REMARKS

Claims 1-32 and 39 are pending, with claims 1 and 39 being independent claims.

Independent claims 1 and 39 stand rejected as obvious over Groot (U.S. 6,359,692) in view of Suematsu (Applied Optics 30:4046-4055, 1991). The rejection is based on "applying the analysis of Suematsu at each spatial location of the interferometry data of Groot" (page 10 of final action).

With respect to the analysis at each spatial location, independent claim 1 recites "calculating a frequency transform of the interference signal at a frequency corresponding to each of selected pairs of the different surfaces in the set of cavity surfaces and extracting the phase of the frequency transform at each of the frequencies corresponding to the selected pairs of surfaces." Similarly, indepedent claim 39 recites an electronic controller which during operation "calculates a frequency transform of the interference signal at a frequency corresponding to each of selected pairs of the different surfaces in the set of cavity surfaces and extracts the phase of the frequency transform at each of the frequencies corresponding to the selected pairs of surfaces." The Examiner purports to find such features in Suematsu. We respectfully disagree.

In particular, we ask the Examiner to specifically show where Suematsu discloses "extracting the phase of the frequency transform at each of the frequencies corresponding to the selected pairs of surfaces," as recited in claim 1.

We fail to find this feature anywhere in Suematsu. Although Suematsu discloses calculating a Fourier transform (Eq. 13), he does not then extract the phase of the Fourier transform. To the contrary, he selects a particular portion of the Fourier trasnform, and then computes the inverse Fourier transform of that portion (Eq. 14).

In his Advisory Action, the Examiner states "Suematsu also teach that the phase is determined by taking the complex logarithm (see Eq. 15 and the discussion between Eqs. 15 and 16). Thus it is clear that Suematsu discloses 'extracting the phase of the frequency transform' using Equs. 14 and 15." The Examiner is simply mistaken.

The section of Suematsu referred to by the Examiner states: "Now we have the phase of the fringe signal in the imaginary part [of Eq. 15]..." (emphasis added). Thus, the phase

determined by Eqs. 14 and 15 refers to the phase of the fringe signal, which is the phase of the time-varying intensity signal (shown in Suematsu as Eq. 7) - not the phase of the Fourier transform.

More specifically, the phase determined in Eq. 15 is $2\pi f_s t + \theta(t) + \phi_0$, which cannot be the phase of the Fourier transform because it is time-dependent. By its very definition, a Fourier transform converts the time-dependence of a signal into a frequency dependence. Therefore, the phase of the Fourier transform at particular frequencies cannot be time-dependent. Accordingly, the phase determined by Eq. 15 cannot correspond to the extracted phase recited in the claims.

In fact, as indicated in our prior response, Suematsu explicitly disregards the phase of the Fourier transform. This point is easily understood by considering the specific example where the nonlinearity in Suematsu's frequency tuning is set to zero, i.e., $\Delta\alpha = \theta(t) = 0$. In this case, the phase of the non-zero frequency peak $C(f - f_s)$ in Suematsu's Fourier transform is simply ϕ_0 (for example, see Eq. 12). Rather than extract this phase, however, Suematsu teaches eliminating it from the fringe signal phase - "[t]o eliminate the unknown constant phases ϕ_0 and ϕ_{R0}, we differentiate the phases and obtain instantaneous angular frequencies" (Suematsu prior to Eq. 19, emphasis added).

Therefore, we submit that Suematsu does not disclose, and in fact, teaches away from "extracting the phase of the frequency transform ..." as recited in claim 1 (and similarly recited in claim 39).

Finally, we note that the Examiner made a number of references to Applicant's specification in his Advisory Action. We fail to see how such references are pertinent to the Examiner's application of the prior art to Applicant's claims. For the Examiner's convenience, however, we point to Applicant's specification at page 11, line 23 through page 12, line 27. This section describes an embodiment of the invention in which the phase of a frequency transform is extracted, such as is claimed in claims 1 and 39. For example, the section states: "the interferometric phase of any elemental cavity can be recovered from the complex amplitude of the Discrete Fourier transform (DFT) of the interference, evaluated at the representative first

order frequency..." (page 11, lines 23-26). The section goes on to provides an explicit mathematical expression for the extracted phase (Eqs. 4 and 5), and then describes how the extracted phase can be used to determine the surface profile of a test surface. Notably, Eqs. 4 and 5 show that there is no time dependence in this extracted phase.

In view of the above, we ask that the Examiner withdraw the outstanding prior art rejections and submit that the application is in condition for allowance.

As noted above, this reply is being filed together with a Request for Continued Examination and a Petition for Extension (including its fee). Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: 11/21/03

Marc M. Wefers* for
David L. Feigenbaum
Reg. No. 30,378

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110-2804
Telephone: (617) 542-5070
Facsimile: (617) 542-8906

***See attached document certifying that Marc M. Wefers has limited recognition to practice before the U.S. Patent and Trademark Office under 37 C.F.R. § 10.9(b).**

20758193.doc